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Red Fox (*Vulpes vulpes*)

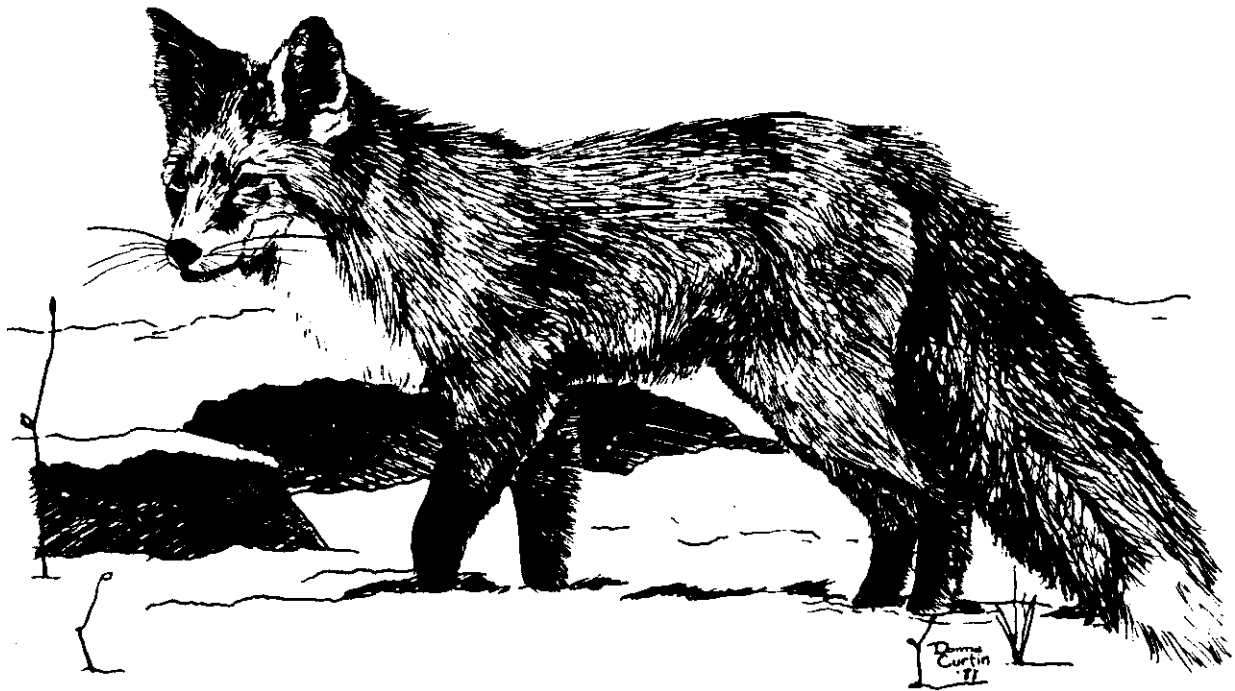
Description

The red fox resembles a small, long-legged dog, with a long, narrow muzzle, erect pointed ears, fluffy, reddish fur and a bushy, white-tipped tail. Its long legs and full coat belies its relatively slight build. These foxes average 3.6 to 5.4 kg (8-12 lbs), stand about 38 cm (15 in) high at the shoulder and are 90 to 105 cm (35.4 to 41.3 in) in length, of which 36 cm (14.2 in) is their bushy tail. Females are slightly smaller than males.

The red fox's coat consists of soft, thick underfur and longer, coarser guard hairs. The color of a fox's back and sides ranges from pale yellow to a deep reddish brown or rust. The belly is white, as is the last 7.5-10 cm (3-4 in) of the tail. The ears, nose, and lower legs are black. Besides the common red color, the red fox has 2 other rarer color phases; the silver fox and the cross fox. The silver phase has a black coat in which the black hairs have bands of white at the tips, giving the coat a frosted appearance. The cross fox has a dark brown stripe down the middle of its back and another across its shoulders. The silver and cross foxes are only relatively common in the most northern ranges, forming approximately 8% and 30%, respectively, of the Canadian population. A rare condition known as Sampson fox occurs when no guard hairs are grown, giving the coat a singed or downy appearance.

Red Fox
Gray Fox

In addition to their size and distinctive coloration (especially the white-tipped tail), red foxes can be distinguished (as can all foxes) from most dogs, coyotes, or wolves by close inspection of their eye pupils which are vertically elliptical, in comparison to the round pupils of the other members of the canine family. The gray fox, which is common throughout much of the red fox's range in New York, is similar in appearance to the red fox. Key distinguishing features of the gray fox include: (1) a generally grizzled, gray-colored upper coat, (2) a dark band along the center of the back and tail, (3) a black muzzle patch beneath the eyes, (4) a black tipped tail, and (5) reddish ears and lower legs. Immobilized or dead foxes can be identified as red foxes on the basis of the slightly lobed edges of their upper incisor teeth; those teeth in the gray fox do not have lobed edges. Also, red foxes usually have 8 teats, while most grays have 6 teats.



Distribution and Abundance

The red fox has a wide distribution through the Northern Hemisphere including North America, Europe, Asia, and North Africa. Only some southern portions of the U.S. do not have native red fox populations. Red foxes prefer open habitat with only scattered forest cover. Pre-colonial New York, with its mature forest cover, supported very sparse red fox populations. Archeological evidence of the presence of red foxes in western New York has been ample; red fox bones were commonly found in Onondaga middens, indicating these Indians ate

foxes regularly. Nevertheless, it is reported that early settlers may have imported red foxes from Europe in an effort to establish huntable populations. Logging and farming activities, however, were more instrumental in increasing fox populations than were the meager stockings. Fox populations fluctuate widely over time on a statewide and regional basis due primarily to food availability and the occurrence of disease.

Life History

Foxes in New York breed from mid-December through late February, with the mean date of conception being January 23. They appear to be promiscuous in their breeding behavior. The male (dog) fox rarely assists the female (vixen) with the care of the young (pups).

A red fox may dig its own den, but normally they take over a woodchuck burrow, possibly doing some excavation to enlarge the burrow. The den is usually located away from human habitation and often is situated in or near some protective vegetation such as shrubs and bushes. In New York State, dens are found in woodlots, brushlands, pastures or cultivated land, wherever a suitable woodchuck burrow occurs, including beneath isolated outbuildings. A fox den may be recognized by the large mound of earth near the 40-cm (15-in) wide entrance and the food debris, such as bones and feathers that are sometimes scattered nearby. There may be 1 or 2 of these easily observed main entrances, plus a few smaller, seldom used entrances. A den several years old with many tunnels and entrances is more attractive to a red fox than a simple hole. If the den is disturbed by domestic dogs or humans, it may be abandoned by the foxes, who will move to another location. Above ground dens are sometimes used when the pups are older in late spring. Red fox dens are used only from early March through early June. Communal denning has been observed where adults with pups have moved into already occupied dens. Vixens seem to accept newcomers readily and may even "adopt" orphaned pups. This behavior increases the chances of transferring diseases such as sarcoptic mange, fatal to virtually all red foxes.

The gestation period of red foxes is 51-53 days. Most vixens whelp sometime between early March and early April. The average litter size is 5 or 6 pups, but it may range from 1 to 9 pups. The pups are about 18 cm (7.2 in) long and weigh about 95 g (3.3 oz) at birth. Newborn pups are covered with grayish-brown, silky hair, and are blind and helpless. Their mother's milk is their primary source of food for about 2 to 3 weeks, but during this time they begin eating food brought to them by their mother and food cached in and around the den before whelping. These scattered small prey items found in the den

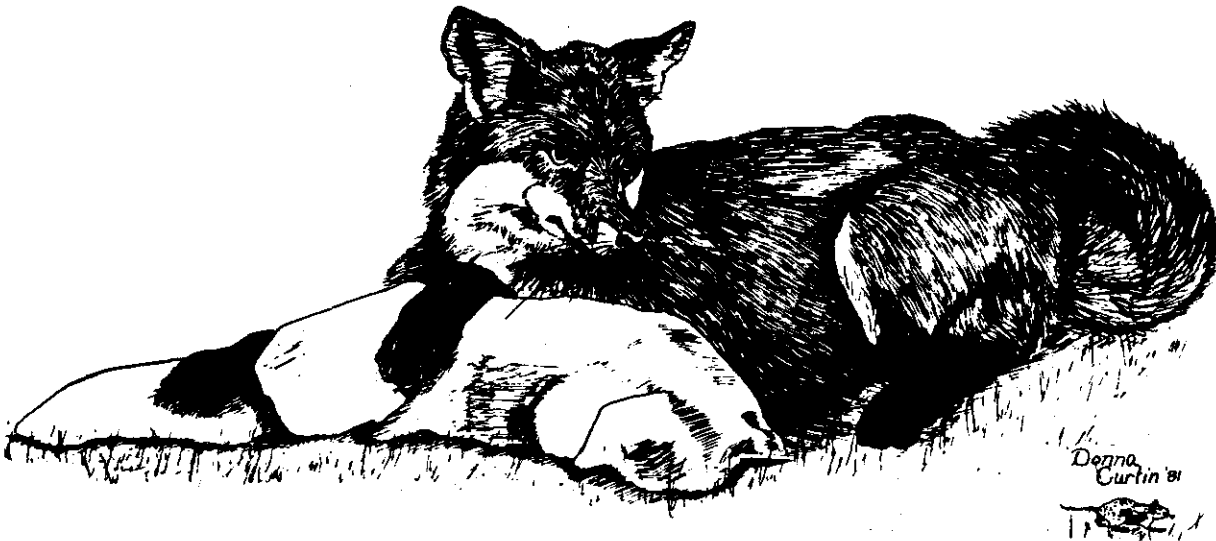
serve to feed those pups who are forced away from the lactating female by their littermates.

By 5 weeks of age, the pups begin moving about the den entrance. At this time they weigh about 1.1 kg (2.5 lb), their coats are woolly, and they more closely resemble the color of adult foxes. They spend much time in what appears to be play activity, but knowledgeable observers believe this to be mutual harassment which may cause early dispersal of weaker pups. They also begin learning to catch food at this young age. Insects, frogs, and mice are the first prey they are able to capture. Pups are weaned by the time they are 5 or 6 weeks old. At this age, their reddish guard hairs have begun to grow. At 4 months, young foxes have reached two-thirds of their adult size. Family members become increasingly independent through late summer until finally the pups disperse from their natal areas sometime between September and March. Both sexes mature at 10 months and most breed during the year of their birth.

Fox population densities and size of home ranges depend on the quality of habitat and may vary considerably. Areas containing abundant food, water, and cover, well-interspersed with denning sites, are capable of supporting relatively high fox populations. Home ranges within such areas are relatively small. Home ranges for fox families are estimated at between 3.6 and 8.1 km² (1.4 and 3.1 mi²).

Dispersal of the young from their natal range is an important mechanism for preventing overcrowding and for taking advantage of underutilized habitat. The proportion of young that disperse and the distance they travel undoubtedly varies with the density of the local fox population. In a Wisconsin study, 58% and 88% of the juvenile females and males, respectively, dispersed during their first year. A slightly lower percentage of adults also dispersed during the study period. Juvenile females and males traveled an average of 28 and 34 km (16.8 and 20.4 mi), respectively. Records of males dispersing over 150 km (90 mi) are common in mid-western studies but such extensive movement was not observed in New York.

"Opportunistic" best describes the red fox's food habits. It feeds principally upon plants or animals that are abundant and easily secured. Naturally, its diet varies with seasonal availability of particular food items. Mammals consumed include cottontail rabbit, snowshoe hare, squirrels, chipmunk, woodchuck, muskrat, mice, moles, and shrews. Birds taken include woodcock, grouse, pheasant, robin, flicker, and waterfowl. Some miscellaneous items are bird and turtle eggs, frogs, snakes, beetles, crickets, grasshoppers, and deer or domestic livestock carrion. Particularly through the late summer and



fall such items as fruits, berries, seeds, and nuts make up a significant portion of the fox's diet.

Red foxes are active day and night. They travel widely through many habitat types while patrolling their home range and searching for food. They locate food by sight, scent, and by their keen sense of hearing. They can hear mice moving under snow, and catch them with a swift pounce. Foxes often are observed during warmer months "mousing" in fields. When a fox has eaten its fill, any extra food is cached in a shallow hole dug in the earth or snow. The fox may return later and eat it, unless some scavenger or another fox finds the cache first and steals the food.

Many mortality factors suppress red fox populations. A variety of mammalian predators (e.g., bobcat, coyote, fisher, long tailed weasel) and avian predators (hawks and owls) may capture an occasional pup, but adults are usually either too large or too fast for these predators. Vehicles kill many foxes as the animals cross highways and hunt mice along road shoulders or medians. Hunters and trappers annually harvest thousands of red foxes in New York State.

Diseases are another decimating factor of New York's red fox population. In the 1940's, when the state's red fox population was at an all-time high, a major outbreak of rabies occurred. Sporadic outbreaks of rabies have occurred since then when red fox populations have reached high levels, but rabies occurs only rarely at normal population levels.

Sarcoptic mange is the most important fatal red fox disease in New York State. The disease is caused by mites and is extremely contagious; death is virtually assured within 4 months. Other common, serious fox diseases include

canine distemper and tularemia. Promiscuous breeding behavior, communal denning, high dispersal rates and mobility permit the rapid spread of communicable diseases in dense fox populations.

Red foxes host a variety of internal parasites such as tapeworms, roundworms, hook worms, flukes, lungworms, heartworms, and coccidians as well as external parasites such as fleas, ticks, and mites.

Red foxes may live 10 years, but the average age of foxes in New York State is much less. In high quality habitat, fox populations can experience up to 75% annual mortality and still maintain a stable population density from year to year.

The red fox's behavior is unpredictable. They have superb senses of smell, sight, and hearing. They sometimes exhibit a shy and elusive manner, sometimes display tremendous curiosity. About the only way to observe undisturbed red foxes is to find a good vantage point overlooking a den site or a meadow where they hunt mice. Pups may be active around a den through the day, but adults hunt open fields during day or night and are often absent. Predator calls that imitate injured prey or distressed pups can be used effectively to lure hungry or curious foxes within sight.

The red fox's bark commonly consists of a sharp yap or bark followed by a series of "yaps". The sound is similar to the hoarse bark of a small dog. They also have an extensive repertoire of yowls, howls, and screeches. Pups can be noisy around the den and adults may bark when alarmed. During breeding season, foxes can be heard almost every still evening. At this time their characteristic, regularly spaced, short bark has an almost bell-like quality.

Red foxes may travel 8 km (5 mi) per night in search of prey and in doing so, they leave behind a maze of tracks. Prints of the front and rear feet measure about 5 cm (2.0 in) and 3.8 cm (1.5 in) long, respectively, and the toenail impressions are distinctive. Foxes frequently travel along cow paths, game trails, and farm lanes; muddy portions of such pathways are good places to look for their prints. Trails made by a red fox walking in snow are typically very straight, with one foot placed directly in front of the other, spaced about 20-25 cm (8-10 in) apart. Domestic dogs, coyotes, and gray foxes have broader chests and therefore their prints have more of a staggered appearance. Following fox trails through the snow can reveal some of their interesting habits. For instance, red foxes seldom use burrows even during extremely cold weather, instead they prefer to spend days napping in an open field or on a ridge that affords good visibility. Large cornfields or woodlands are popular resting sites for foxes on hot summer days.

Scats (fecal droppings) are yet another sign of a fox's presence. The shape of the droppings varies considerably depending upon the fox's diet, but they are usually about 5.0 to 7.6 cm (2-3 in) long, narrow, and consist of 2 or 3 thinly joined segments which are tapered and somewhat twisted at the ends. Foxes have the unique habit of depositing their scats in prominent places, for example, on stumps, flat rocks, bare spots, along trails or road ways. Hair and bits of bone are frequently found in fox scats.

Habitat

Ideal red fox habitat typically is a mixture of active and abandoned farmland. Such areas generally consist of cropland, old hayfields, hedgerows, vineyards and orchards. Extensive areas of active farmland interspersed with hedgerows, brushlots and hayfields also can be good habitat. Preferred prey, such as mice, rabbits, woodchucks, and gamebirds abound in early succession plant communities and alternate food items like insects, fruits, and berries are also present. Red foxes inhabit both areas of intensive agriculture and tracts of unbroken mature forests, but population densities are highest where average field sizes are small and a variety of different habitat types are intermixed, because such places are where their prey are most abundant.

Ecological Role

It is the nature of predators to prey primarily upon those prey species encountered most frequently and that can be captured most easily. Where populations of small game such as ring-necked pheasants, ruffed grouse, or cottontail rabbits are high, these species will constitute a substantial portion of the fox's diet. But because prey populations are high, the proportion of the population taken by foxes probably is fairly insignificant, considering the high mortality rate of nearly all game species due to other factors. Conversely, an occasional small game animal taken by foxes from populations at a critically low stage can be a significant loss. But predators like foxes seldom are the cause of low small game populations. Other factors such as diseases, lack of suitable habitat or severe weather conditions generally are responsible for sparse game populations. In New York State the woodchuck is very important to the red fox; it is a major prey species and is the primary digger of whelping dens.

Analyses of fox scats has revealed in study after study conducted throughout the fox's range that the most frequent prey items are small mammals (primarily mice and voles) with cottontail rabbits a common, but distant

second. This is not surprising considering that mouse numbers can be as high as 250 per ha (100/A). Through the summer and fall seasons the occurrence of prey species in the fox's diet drops drastically, being replaced by vegetable matter. In conclusion, a chief ecological role of the red fox appears to be that of exploiting prey species that are especially abundant. In the agricultural regions of New York red foxes may perform a valuable service by helping to control excessive numbers of economically injurious small mammals.

Management

In the 1940's several counties in New York offered bounties for foxes in an effort to reduce populations that were considered a threat to poultry farmers and small game, such as the ring-necked pheasant. Today the fox is recognized as contributing to the control of agricultural pests such as mice, voles, and rats, and as an extremely valuable furbearer. Even intensive hunting and trapping pressure have only marginal effects upon fox populations in New York; thus current seasons are quite liberal and no bag limit is imposed. Rules and regulations governing the harvesting of foxes are designed to ensure that they are taken in a fair and humane manner and only through the fall and winter when the fur is most valuable.

Economic and Social Values

The red fox is economically valuable to residents of New York as one of many predators of agricultural pests and as a renewable source of pelts for the fur industry. By helping to control small mammals and rodent populations, red foxes help farmers, nurserymen, orchardists, and grape growers. Measures designed to control small mammal pests are costly, have limited applicability, and often are only partially effective. Moderately dense populations of predators such as red foxes are a subtle but substantial asset to agriculturalists. They also "convert" unrecoverable nuisance species to fine fur.

The pelt value of several long-furred furbearer species has tripled or quadrupled in the past decade. In recent years trappers could expect to receive about \$50 for an average, prime red fox pelt and considerably more for a large, extra fine pelt. By the time the furs are sold as garments in this country or shipped abroad, their actual value increases several times as raw fur buyers, auction houses, fur dressers and buyers, and the wholesale and retail merchants handle the pelts.

As valuable as the pelts are, few fox trappers or hunters take foxes just for economic gain. Trapping, hunting with hounds, or using a predator call are demanding, challenging, specialized, and sometimes exasperating forms of outdoor recreation. None of the above methods of taking red foxes can seriously deplete healthy fox populations. During the rabies outbreak of the 1940's, New York employed trappers in an attempt to reduce population densities in specific localities. Even after intense trapping at den sites in the spring and summer, some resident animals remained in the trapped areas. Because of relatively large litters, fairly high survival rates in reduced and healthy populations, high rates of dispersal, and innate wariness and an apparent ability to learn from past experiences, current harvesting pressure and techniques seldom do more than slow the growth of fox populations.

Red fox populations fluctuate locally throughout its range due to mortality and survivors' tendency to shift to more optimal den sites each year. The primary decimating factor of inordinately high populations has been sarcoptic mange, rabies, or some other disease. The harvesting of red foxes tends to suppress population levels, thereby reducing the likelihood of an extensive outbreak of contagious diseases.

Probably the most serious, though remote, threat the red fox poses to New York residents is the spread of mange and rabies to pets or livestock. Fortunately, the incidence of rabies among foxes is low and most pets are vaccinated, which reduces the possibility of human infection. However, dogs cannot be vaccinated against sarcoptic mange. In recent years the rare contamination of pastured domestic livestock has been about the only way rabies transmittal has manifested itself as a problem in New York. A potential danger in this respect is that people may find, harbor, and handle "sick" or docile foxes in misguided attempts to rehabilitate them. Sightings of such animals should be reported to an Environmental Conservation Officer or Health Department official. Sarcoptic mange mites can infect people. Generally, foxes suspected of being sick or abnormal should not be handled.

The red fox has long had the reputation of being a poultry thief, but due to the modern practice of keeping poultry confined, foxes seldom prey on domestic fowl. Foxes may be a threat to unpenned domestic fowl and may take an unsuspecting house cat if allowed to roam free. Some sportsmen still believe that foxes are responsible for low small game populations whenever that situation occurs. As discussed earlier though, red foxes are just one of many factors that influence game populations.

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Gray Fox (*Urocyon cinereoargenteus*)

Description

The gray fox is somewhat more stout than the red fox. Its muzzle and legs are a bit shorter, yet its weight is about the same (3 to 6 kg [7-13 lb]). The average length of the gray fox from nose to tip of tail is 90 to 104 cm (35.5-41.0 in), and the length of the tail is 30 to 39 cm (11.8-15.4 in). Several key distinguishing characteristics based on coat coloration can be used to distinguish the gray from the red fox. The gray's head, back, sides, and flanks are a grizzled gray color, while the belly and inside of the legs are a rusty tan to orange color. A darker band of gray or black runs the length of the back to the tip of the tail, which is encircled in black. The gray's fur is somewhat more coarse in texture than is the red fox's.



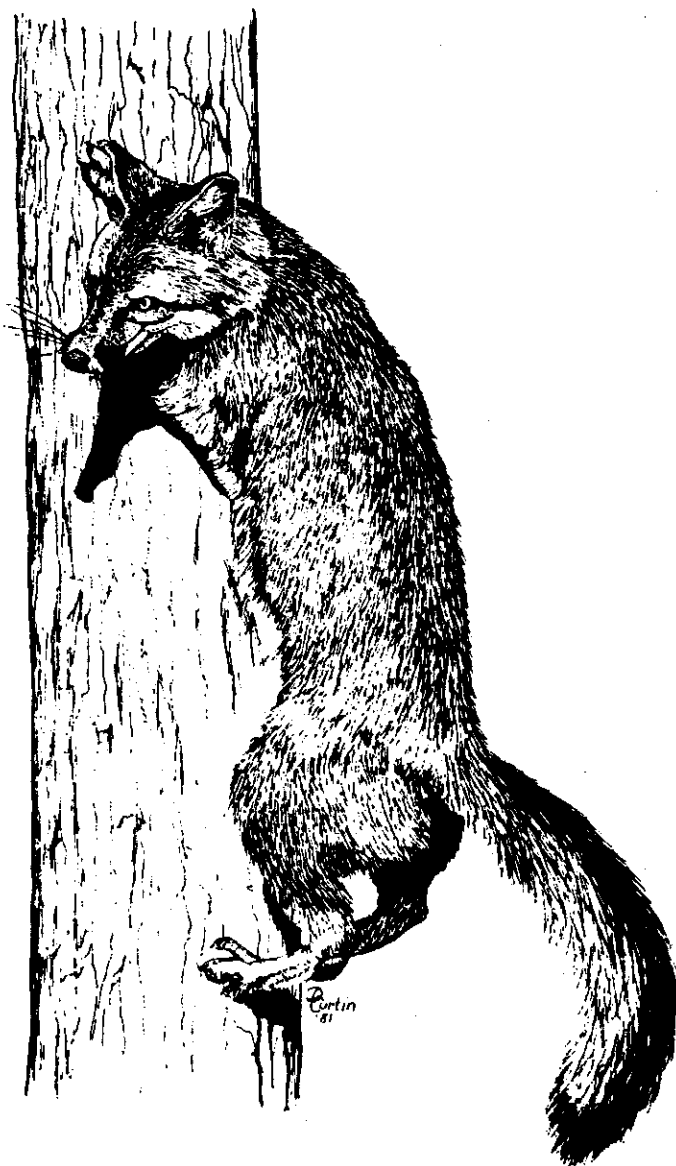
Distribution and Abundance

The gray fox is essentially a southern species whereas the red is a more northern species. But in general the gray's range through the U.S. coincides with that of the red fox with a few exceptions. Unlike the red fox, gray foxes are found all through Florida and California, but are absent from Idaho, Wyoming, Montana, and most of Washington, where the red is present. Both species are common throughout New York; the red fox is more common than the gray in the Adirondacks.

Life History

The breeding season for gray foxes extends from mid-February through March. The gestation period is from 50 to 60 days. Litters of 1 to 7 blind and helpless kits (pups) are normal, usually born in April. Hollow logs or stumps, crevices in ledges, and burrows in thick brush or under old stumps are typically used as dens by gray foxes.

When the kits can ingest solid food, at 2 to 3 weeks of age, the male brings prey to the den site. The den is abandoned between late summer and late fall although the family may remain loosely associated until early winter when the pups usually disperse from the natal home range. The proportion of the pups that disperse and the distance they travel vary with the population density on the natal range and surrounding area, but dispersal statistics probably are similar to those of the red fox. Both juvenile males and females are sexually mature in their first year.



Depending upon the quality of the habitat, gray fox population densities and sizes of the home ranges vary, but home ranges of 2.6 to 7.8 km² (1 to 3 mi²) are common.

Food habits of the gray fox are similar to those of the red fox with various prey and plant material taken roughly in proportion to their availability through the seasons. In the spring, summer, and fall, important prey include mice, cottontail rabbit, woodchuck, chipmunk, birds, and insects, although up to 30 percent of their diet may consist of seeds, fruits, and berries. Through the winter when insects and vegetable matter are covered by snow, mammalian prey and carrion are the predominant food items. As one of its common names, "tree fox," indicates, the gray fox is adept at climbing trees, an ability unique in the dog (canine) family. This characteristic may allow the gray fox to feed upon tree squirrels, raid squirrel food caches, and prey on owl and hawk nests.

All of the mortality factors of the red fox discussed previously, except sarcoptic mange, generally apply to the gray fox. There is some evidence that gray foxes may be particularly susceptible to canine distemper. This disease can be spread through urine and feces as well as through the tissues and fluids of prey. Raccoons and skunks, which are susceptible but may more often recover spontaneously, could act as reservoir hosts to further threaten gray foxes.

Partially because gray foxes prefer brush-woodland habitat and are more nocturnal than red foxes, the grays are seldom seen by the casual observer. They are inquisitive, however, and readily come to a predator call that imitates injured prey. Tracks of the gray fox are a bit smaller and more rounded than those of the red fox. Gray fox toe prints are larger because they have naked pads in contrast to the fur-covered toepads of the red fox. The prints resemble those of a large house cat, but unlike cats, gray foxes can not retract their claws, consequently the imprints of the toenails are visible in sand, mud, or snow.

Habitat

"Wood fox", another common name of the gray fox, accurately reflects the animal's preference for wooded habitat over the more open, field habitat of the red fox. In New York the gray fox frequently inhabits rough, broken terrain in dense forest or brushland. Heavily forested swamps also are prime areas for the gray fox, indicating that it often shares its habitat with raccoons. Gray foxes also seem better adapted to suburban habitats, especially suburban wetlands.

Ecological Role

The gray fox is often one of the largest mammalian predators in its home range and as such it plays an important role in the natural food web there. Small mammal populations, such as cottontail rabbits, have tremendous reproductive potential and periodically reach high levels, followed by drastic declines due to food scarcity, intraspecific competition, and stress. Predators like the gray fox tend to slow population growth and help maintain stability in these prey populations. Generally, the gray fox and red fox may have overlapping ecological roles. The gray fox, despite canine distemper, may be gaining in abundance relative to red foxes, which may be increasingly controlled by sarcoptic mange.

Management

Management of the gray fox in New York is similar to that of the red fox. Harvests are controlled by limited hunting and trapping seasons, set to coincide with prime pelt conditions (fall and winter). An important consideration in management is the surveillance of fox diseases. The public should be aware that Environmental Conservation Officers and wildlife biologists need their help in locating sick foxes because there are no independent systems for performing this function. If you find what appears to be a sick fox, report this sighting to a conservation officer or biologist.

Economic and Social Values

The economic and social value of gray foxes is similar to that of the red fox, but their pelt value is somewhat less than the red fox. Gray fox populations may be fairly dense in some areas, but because they are not as common as red foxes on a state-wide basis, fewer people are as familiar with this species.

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